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EXAMINER	
TORRES, JUAN A	

ART UNIT	PAPER NUMBER
2631	

DATE MAILED: 08/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/002,185	NAYLER, COLIN D.	
	Examiner	Art Unit	
	Juan A. Torres	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 June 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The modifications to the drawings were received on 06/30/2005. These modifications are accepted by the Examiner.

Response to Arguments

Applicant's arguments filed on 06/30/2005 have been fully considered but they are not persuasive.

As per claims 1 and 6:

The Applicant contends, "Each of the independent claims 1 and 6 specify an arrangement for supplying equalizer settings to a digital-feedforward equalizer. In particular, each of the independent claims specify: (1) supplying a prescribed initial set of equalizer settings to the digital feedforward equalizer, (2) comparing the equalized signal samples relative to a prescribed equalization threshold. and (3) selectively changing the supplied equalizer settings, based on the comparing step, until the equalized signal samples reach the prescribed equalization threshold....Hence, use of a digital feedforward equalizer enables rapid convergence based on the independent initialization by selectively changing the supplied equalizer settings until the prescribed equalization is reached, while minimizing the introduction of instability due to unsettled data (see, e.g., page 5, line 31 to page 6, line 3 of the specification). The use of a digital-feedforward equalizer, plus the selective changing of the supplied equalizer settings until the equalized signal samples reach the prescribed equalization threshold, is neither disclosed nor suggested in the applied prior art. Lo describes an equalization

technique that relies on a closed loop system using a phase locked loop (PLL) (see, e.g., Abstract at lines 10-13', col. 2, lines 30-34; col. 3, lines 16-24). In particular, Lo relies on a PLL 34 to identify a timing correlation of an edge of an equalized signal relative to a recovered clock signal (RCLK).".

The Examiner disagrees and asserts, that, as indicated in the previous Office Action, what lo discloses is an apparatus and method for determining an optimum equalizer setting for a signal equalizer in a communication network receiver (title of the patent); and an optimum equalizer setting is determined for a signal equalizer in a network receiver by successively setting the equalizer to different predetermined settings.. (abstract).

The Applicant contends, "Lo further describes that the optimum equalizer setting is chosen based on determining the relative edge distribution for each equalizer setting, and identifying the corresponding relative edge distribution that demonstrates the minimum distribution of jitter (i.e., based resembling the distribution curve 46 of Fig. 4A, see col. 4, lines 47-50).... As apparent from the foregoing, Lo provides no disclosure whatsoever of the claimed "digital feedforward equalizer", as claimed. Nor does Lo provide any suggestion of any digital feedforward equalizer, since Lo relies on using a PLL in a closed loop system to determine the minimum jitter. For this reason alone, the rejection should be withdrawn because it fails to demonstrate that Lo discloses each and every element of the claim"

The Examiner disagrees and asserts, that, it is very well known that an equalizer is an adaptive filter that try to adapt the response of the channel to reduce (ideally to

remove) the ISI (Inter Symbol Interference). The use of terms like feedforward equalizer is more relate to DFEs (Decision Feedback equalizer) because in this structure there are two equalizers and one way the differentiate them is to call FFE (feedforward equalizer) to the equalizer that is in the path of the signal and FBE (feedback equalizer to the equalizer that is not in the path of the signal). If only one equalizer is used, usually doesn't need to have an identifier. The equalizer used by Lo is the same function an location that the equalizer disclosed by the present application, it is in the path of the signal, the fact that he doesn't call feedforward doesn't make any difference because has the same function. An equalizer is an adaptive filter that changes its coefficients adaptively. There are several documents and US Patents that support this view that have been included in this Office Action including:

a) Yu (US 5517527 A) that clearly shows that the equalizer disclosed in the reference is a feedforward equalizer (figure 3) that in this particular case he call it feedforward filter, that by the way it is his real function. The structure presented in this US patent is very similar to the architecture disclosed by the applicant including the adaptation of the filters (feedforward and feedback) using the error detector (also called noise detector, because the slicer (threshold detector) error will provide the noise in the signal.

b) He (US 6870881 B1) that in the same way discloses a FFE (feedforward Equalizer with the same structure that the Applicant and Yu. In this case he called the adaptive filter FFE (figure 7)

c) Chadha (US 6876699 B1) also discloses (figure 4 column 13 lines 50-58) the same architecture and in this case, and he also called FFE (Feedforward equalizer).

All these references are used for illustrative purposes only, and are not used as a base of the rejections.

The Applicant contends, "Further, as demonstrated above, Lo does not disclose or suggest the claimed selectively changing the supplied equalizer settings, based on the comparing step, until the equalized signal samples reach the prescribed equalization threshold." Rather, Lo requires each and every equalizer setting to be evaluated to determine the minimum jitter, and hence describes necessarily changing the supplied equalizer settings. Claims 1 and 6, however, specify "selectively changing", thereby permitting the possibility that the claimed prescribed initial set of equalizer settings may be used, without further modification, based on the prescribed initial set generating equalized signal samples that reach the prescribed equalization threshold. For this reason alone the 102 rejection should be withdrawn.".

The Examiner disagrees and asserts, that, Lo teaches selectively changing the equalizer settings, as indicated in the previous Office Action, Lo discloses a method in a physical layer transceiver coupled to a prescribed network medium having an undetermined length, the method comprising: supplying a prescribed initial set of equalizer settings to a digital feedforward equalizer, the digital feedforward equalizer configured for outputting equalized signal samples based on equalizing received signal samples, having encountered inter-symbol interference by transmission via the prescribed network medium, according to supplied equalizer settings (figure 1 column 2

lines 45-47); comparing the equalized signal samples relative to a prescribed equalization threshold (figure 2 column 6 lines 1-4); and selectively changing the supplied equalizer settings, based on the comparing step, until the equalized signal samples reach the prescribed equalization threshold (column 7 lines 30-31).

The Applicant contends, "Applicant traverses the reference to column 6, lines 1-4 as teaching the claimed "prescribed equalization threshold" -- the cited portion describes a signal detection signal that identifies whether a cable is connected to the receiver: (T)he equalizer 32 also outputs a reset signal and a detection signal (SIG-DET), which may be used by the equalizer 36 to detect an initialization condition in the equalizer controller 32, **for example** a reset state or a disconnect state. (Col. 4, lines 1-5). As shown in FIG. 5, the state machine includes a link down state 72, executed by the equalizer controller 36 in response to reception of either a reset signal or deassertion of the signal detect signal (SIG-DET), indicating no signal is present on the medium 14. (Col. 5, lines 33-37). The equalizer controller 36 remains the link down state 72 until reception of the detection signal (SIG-DET). The detection signal SEG-DET (sic) is a logical signal output by the equalizer 32 that indicates that signal transitions are occurring above a defined threshold, for example when a cable L is connected to the receiver 30. (Col. 5, line 66 to col. 6, line 4). Hence, the "threshold" in Lo refers to a basic signal threshold to indicate that the a cable is connected to the receiver, and not the claimed "prescribed equalization threshold". Anticipation cannot be established based on a piecemeal application of the reference, where the Examiner picks and chooses isolated features of the reference in an attempt to synthesize the

claimed invention. Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. For these and other reasons, the 102 rejection of independent claims 1 and 6 should be withdrawn.

The Examiner strongly disagrees and asserts, that, Lo teaches selectively changing the equalizer settings, as indicated in the previous Office Action, Lo discloses a method in a physical layer transceiver coupled to a prescribed network medium having an undetermined length, the method comprising: supplying a prescribed initial set of equalizer settings to a digital feedforward equalizer, the digital feedforward equalizer configured for outputting equalized signal samples based on equalizing received signal samples, having encountered inter-symbol interference by transmission via the prescribed network medium, according to supplied equalizer settings (figure 1 column 2 lines 45-47 "The method includes setting the signal equalizer to one of a plurality of predetermined equalizer settings"); comparing the equalized signal samples relative to a prescribed equalization threshold (figure 2 column 6 lines 1-4 The detection signal SEG.sub.-- DET is a logical signal output by the equalizer 32 that indicates that signal transitions are occurring above a defined threshold); and selectively changing the supplied equalizer settings, based on the comparing step, until the equalized signal samples reach the prescribed equalization threshold (column 7 lines 30-31 "an optimum equalizer setting is determined for a signal equalizer by successively setting the equalizer to different predetermined settings, and determining the normalized distribution result for each of the predetermined equalizer settings").

The use of feedforward equalizers in the way claimed is very well known. In the previous Office Acton the Examiner indicated prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yu (US 5517527) discloses an adaptive equalizer to be implemented in a receiver to cancel the ISI with a decision feedback equalizer structure including a feedforward filter and a feedback filter. Werner (US 6069917) discloses a decision feedback equalizer (DFE) with a feed-forward filter and a feedback filter using blind training of the DFE is performed using a statistical-based tap updating algorithm for the feed-forward filter, and a symbol-based type of tap updating algorithm for the feedback filter. Kuenast (US 5027369) discloses a rapid convergence decision feedback equalizer; the DFE has two separate portions which each function as an individual DFE having a different number of taps and different adaptive tap sizes; a first DFE portion operates alone to rapidly converge the measured error to a predetermined threshold; a control circuit is used to determine when the threshold is reached and to activate the second DFE portion for rapid further error convergence. Gelfand (US 6144697) discloses equalization techniques to reduce intersymbol interference.

In addition in this Office Action the Examiner recommends the reading of Becker (US 3292110 patented in 1962) "transversal equalizer for digital transmission systems, wherein polarity of time-spaced portions of output signal controls corresponding multiplier setting" that also discloses all the features of the present invention; also "The digital signal processing handbook" by Vijay Madisetti & Douglas Wiliams, section VI" Adaptive Filtering" chapters 18-24; "Adaptive Filtering Algorithms and practical

implementation" by Ramirez Diniz; and "Principles of Digital Transmission with wireless applications" chapter 8 pp 380-426 by Sergio Benedetto.

For these reasons and the reason stated in the previous Office Action, the rejection of claims 1 and 6 are maintained.

As per claims 4-5 and 9:

The Applicant contends, "The rejection of claims 4-5 and 9 is further traversed. Lo provides no reference whatsoever to any "absolute value", let alone the claimed location where a statistically substantial number of the data values representing a symbol absolute value of "1" should occur for an equalized signal. As described above, Lo relies on identifying timing relationships between a equalized signal edge 40 and an edge 44 of the recovered clock. Column 6 of Lo describes identifying whether the timing relationship for each signal edge 40 falls within one of the distribution regions 48, 50, 52, 54, used to identify jitter.".

The Examiner disagrees and asserts, that, as indicated in the previous Office Action, Lo discloses a counter configured for determining, within the count interval, a first number of the equalized signal samples having an absolute value that exceeds a first reference level occurs for an equalized signal (figure 5 block 76 column 6 lines 24-32 "The equalizer controller 36 exits the blind wait state 74 and enters a count transition state 76 in order to determine the normalized distribution result for each of the predetermined equalizer settings. Specifically, the count transition state 76 counts the number of signal transitions on the incoming data signal. The total number of transitions is counted using the "transition_count" state variable, and the number of transitions of

the outside segments 48 and/or 54 are counted using the "outside_count" (OC) state variable. Hence, if any digital code (SEG) representing any correlation result is received from the digital PLL 34, the count transitions state 76 increments the transition count.").

Obviously a counter that is set to 1 and is incremented, it value and it absolute value is the same, because its value is always positive.

For these reasons and the reason stated in the previous Office Action, the rejection of claims 4-5 and 9 are maintained.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Lo (US 6097767).

As per claim 1 Lo discloses a method in a physical layer transceiver coupled to a prescribed network medium having an undetermined length, the method comprising: supplying a prescribed initial set of equalizer settings to a digital feedforward equalizer, the digital feedforward equalizer configured for outputting equalized signal samples based on equalizing received signal samples, having encountered inter-symbol interference by transmission via the prescribed network medium, according to supplied equalizer settings (figure 1 column 2 lines 45-47); comparing the equalized signal samples relative to a prescribed equalization threshold (figure 2 column 6 lines 1-4);

and selectively changing the supplied equalizer settings, based on the comparing step, until the equalized signal samples reach the prescribed equalization threshold (column 7 lines 30-31).

As per claim 2 Lo discloses claim 1. Lo also discloses supplying the prescribed initial set of equalizer settings based on a predetermined characterization of the prescribed network medium at a prescribed length (figure 1 column lines 34-39 and figure 5 column 5 lines 23-27).

As per claim 3 Lo discloses claim 2. Lo also discloses selectively changing step includes successively supplying groups of equalizer settings based on the predetermined characterizations of the prescribed network medium at successively changing lengths (figure 2 column 1 lines 34-39 and column 7 lines 28-40).

As per claim 4 Lo discloses claim 3. Lo also disclose selectively changing step includes successively generating a count interval representing reception of a statistically-based prescribed number of signal samples (column 6 lines 21-24); first determining, within the count interval, a first number of the equalized signal samples having an absolute value that exceeds a first reference level occurs for an equalized signal (column 6 lines 24-43); and second determining whether the first number reaches the prescribed equalization threshold, the prescribed equalization threshold representing an expected number of detected signal samples that exceed the first reference level within the count interval (column 6 lines 44-57).

As per claim 5 Lo discloses claim 1. Lo also disclose selectively changing step includes successively generating a count interval representing reception of a

statistically-based prescribed number of signal samples (column 6 lines 21-24); first determining, within the count interval, a first number of the equalized signal samples having an absolute value that exceeds a first reference level occurs for an equalized signal (column 6 lines 24-43) ; and second determining whether the first number reaches the prescribed equalization threshold, the prescribed equalization threshold representing an expected number of detected signal samples that exceed the first reference level within the count interval (column 6 lines 44-57).

As per claim 6 Lo discloses a physical layer transceiver configured for retrieving signal samples from a prescribed network medium having an undetermined length, the physical layer transceiver comprising: a digital feedforward equalizer configured for generating equalized signal samples from the retrieved signal samples and based on supplied equalizer settings, the retrieved signal samples having encountered intersymbol interference by transmission via the prescribed network medium (figures 1 and 2 blocks 16 and 32 column 1 line 23-32 and column); and an equalizer controller configured for supplying the supplied equalizer settings to the digital feedforward equalizer, the equalizer controller configured for supplying a prescribed initial set of equalizer settlings and comparing the equalized signal samples, having been generated based on the initial set of equalizer settings, relative to a prescribed equalization threshold, the equalizer controller configured for selectively changing the supplied equalizer settings until the equalized signal samples reach the prescribed equalization threshold (figure 2 block 36 column 4 lines 61-64).

As per claim 7 Lo discloses claim 6. Lo also discloses that the equalizer controller includes a coefficients generator configured for outputting the prescribed initial set of equalizer settings and the selectively changed equalizer settings based on a predetermined characterization of the prescribed network medium at respective prescribed lengths (figure 1 column lines 34-39 and figure 5 column 5 lines 23-27).

As per claim 8 Lo discloses claim 7. Lo also discloses that the equalizer controller further comprises a controller state machine configured for asserting an initial signal at initialization of the digital feedforward equalizer and a change signal based on a comparison result between the equalized signal samples and the prescribed equalization threshold, the coefficients generator configured for outputting a corresponding group of equalizer settings representing a successively changing network medium length in response to each corresponding assertion of the change signal (figure 5 column 5 lines 23-27 and column 7 lines 28-40).

As per claim 9 Lo discloses claim 8. Lo also discloses that the equalizer controller further comprises: a timer configured for generating a count interval representing reception of a statistically-based prescribed number of signal samples (figure 5 block 74 column 6 lines 5-12); a counter configured for determining, within the count interval, a first number of the equalized signal samples having an absolute value that exceeds a first reference level occurs for an equalized signal (figure 5 block 76 column 6 lines 24-32); and a comparator configured for outputting an equalization status signal based on whether the first number reaches the prescribed equalization threshold, the prescribed equalization threshold representing an expected number of detected

signal samples that have an absolute value exceeding the first reference level within the count interval, the controller state machine selectively asserting the change signal based on the equalization status signal (figure 5 block 78 column lines 44-57).

As per claim 10 Lo discloses claim 1. Lo also discloses that the prescribed equalization threshold represents an expected number of detected signal samples having been detected within a prescribed count interval and having an absolute value exceeding a reference level (column 6 lines 24-43).

As per claim 11 Lo discloses claim 10. Lo also discloses that the reference level identifies a prescribed minimum value necessary for an ideal equalized signal sample to be detected as a prescribed data value (column 6 lines 44-57)

As per claim 12 Lo discloses claim 6. Lo also discloses that the prescribed equalization threshold represents an expected number of detected signal samples having been detected within a prescribed count interval and having an absolute value exceeding a reference level (column 6 lines 24-43).

As per claim 13 Lo discloses claim 12. Lo also discloses that the reference level identifies a prescribed minimum value necessary for an ideal equalized signal sample to be detected as a prescribed data value (column 6 lines 44-57)

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is (571) 272-3119. The examiner can normally be reached on Monday-Friday 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Juan Alberto Torres, Ph. D.
07-14-2005

KEVIN BURD
PRIMARY EXAMINER